



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/591,978	09/05/2006	Kaneko Chiba	B-6122PCT 623712-6	9335
36716 7590 09/30/2010				
LADAS & PARRY				
5670 WILSHIRE BOULEVARD, SUITE 2100				
LOS ANGELES, CA 90036-5679				
EXAMINER				
CHOI, FRANK I				
ART UNIT		PAPER NUMBER		
1616				
MAIL DATE		DELIVERY MODE		
09/30/2010		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/591,978

**Applicant(s)**

CHIBA ET AL.

**Examiner**

FRANK I. CHOI

**Art Unit**

1616

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 October 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/5508)
- Paper No(s)/Mail Date \_\_\_\_\_

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 03/022736 in view of JP 2002-307053, JP 60-122337, McGrath et al. (US 6,649,145), Bunkin et al., Aquarius and Didenko et al..

The invention is directed to ozone nanobubble water comprising oxygen nanobubbles having a bubble diameter of 200 nm or less being surrounded by an inorganic shell comprised predominantly of electrolytic ions positioned to inhibit said oxygen from dissolving into the aqueous solution and a method of producing the same by applying physical irritation to oxygen-containing microbubbles to reduce the size of the same.

WO 03/0227356 discloses that the merit of water discharge in the product of an ozonated water is that production and dissolution of the ozone take place at the same time (page 4, lines 10-13). It is disclosed that about 2 liters of an ozonated water with 6 mg/l concentration was produced (page 4, lines 15,16). It is disclosed that fine bubble can be produced by a bubble generator (page 9, lines 13-30). An apparatus is disclosed where the water discharge system has two electrodes insulated with at least one dielectric and an insulator body surrounding the metal electrodes, the water discharge system producing through a dielectric barrier discharge the ozone and ozonated water (Claim 1).

JP 2002-307053 disclose the use of ultrasonic vibrations to effect the ozone bubbles (claims, paragraph 0026).

JP 60-122337 disclose the use of a rotation shaft with a screw blade which has thin holes to effect the ozone bubbles (claims, page 3, line 8 to page 4, line 16).

McGrath et al. discloses oxygen nanobubbles having a size of 20-30 nm which are prepared by flowing liquids over hydrophobic surfaces (Column 7, lines 43-55). It is disclosed that nanobubbles allow higher concentrations of oxygen to be achieved in the aqueous solution and that the solutions can be prepared with physiological saline (Column 7, lines 44-65).

Bunkin et al. disclose that submicrobubbles can be stabilized by ions and that these "bubstons" formed in water have a radii of approximately 1-10 nm (Page 208).

Aquarius discloses that a 1000 ppm solution of sodium chloride has an electrical conductivity of 1990  $\mu\text{S}/\text{cm}$  (Page 1).

Didenko et al. disclose that cavitation is the formation and collapse of bubbles in liquid (Page 107885). It is disclosed that adiabatic compression of bubbles results in increase in extreme heat as the heat generated by the compression of the bubble is faster than the surrounding liquid can dissipate said heat (Page 10786). It is disclosed that if enough energy is absorbed by the water molecules they will dissociate into hydrogen atoms and hydroxyl radicals (Page 10786).

WO 03/0227356 disclose the production of ozone bubbles and ozonated water where the a dielectric barrier is used to effect the ozone bubbles. The difference between WO 03/0227356 and the claimed invention is that WO 03/0227356 does not expressly disclose the use of ultrasonic vibrations or circulating screwblades which have holes to effect the bubbles or ozone

Art Unit: 1616

bubbles that are 200 nm or less, where the water has a salinity concentration in the range of 0.01% to 3.5%, where the nanobubbles have an inorganic shell of electrolytes, including hydrogen and hydroxide ions, where the electric conductivity of the aqueous solution reaches at least 300 $\mu$ S/cm and where adiabatic compression increases the temperature such that a physiochemical change involving extremely high temperatures around each of the microbubbles. However, the prior art amply suggests the same as JP 2002-307053 disclose the use of ultrasonic vibrations to effect the ozone bubbles; JP 60-122337 disclose the use of a rotation shaft with a screw blade which has thin holes to effect the ozone bubbles; McGrath discloses that oxygen bubbles having a size of 20-30 nm can be prepared with physiological saline used as the carrier; Bunmkin et al. disclose that submicrobubbles can be stabilized by ions and that these "bubstons" formed in water have a radii of approximately 1-10 nm; Aquarius discloses that a 1000 ppm solution of sodium chloride has an electrical conductivity of 1990  $\mu$ S/cm; and Didenko et al. disclose that the collapse of bubbles in liquid result in the generation of heat during adiabatic compression which heat can cause dissociation of water molecules into hydrogen atoms and hydroxyl radicals.

As such, one of ordinary skill in the art would have been motivated to modify the prior art as above with the expectation by use of the same that the ozone bubbles can be prepared by agitation via ultrasonic vibrations or circulating screwblades, that when the bubble collapse during adiabatic compression that heat will be generated resulting in dissociation of water molecules into hydrogen and hydroxide ions, that complete collapse will be inhibited by the presence of a saline solution resulting in the formation of submicronbubbles which are

surrounded by the electrolyte, hydrogen and hydroxide ions and that the saline solution will have a electrical conductivity which is greater than 300  $\mu\text{S}/\text{cm}$ .

The Examiner has duly considered the Applicant's arguments but deems them moot in light of the new grounds of rejection herein.

Therefore, the claimed invention, as a whole, would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made, because every element of the invention has been collectively taught by the combined teachings of the references.

### ***Conclusion***

A facsimile center has been established in Technology Center 1600. The hours of operation are Monday through Friday, 8:45 AM to 4:45 PM. The telecopier number for accessing the facsimile machine is 571-273-8300.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frank Choi whose telephone number is (571)272-0610. The Examiner maintains a flexible schedule, however, the Examiner may generally be reached Monday, Tuesday, Wednesday and Thursday, 6:00 am – 4:30 pm (EST).

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's Supervisor, Johann R. Richter, can be reached at (571)272-0646. Additionally, Technology Center 1600's Receptionist and Customer Service can be reached at (571) 272-1600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Frank Choi  
Patent Examiner  
Technology Center 1600  
September 29, 2010

/Johann R. Richter/

Supervisory Patent Examiner, Art Unit 1616